Table 2 lists the various categories of the present occupations of the graduates. The ranges reflect that 20.7% of the graduates were employed in a production agriculture occupation which included farmers, ranchers, and nursery operators, and that 1.8% were unemployed at the time of the survey. With respect to rankings of competencies, the table shows a close relationship between the graduates who were employed either in governmental agencies, education/extension, agri-business/sales and service, or were graduate students.

Conclusion

The results of the survey were quite useful. The objective of the agronomy curriculum should be to provide the best possible graduate for the employer. The results have given the Department of Agronomy a closer look at what competencies are needed by their graduates. The Department has undertaken a few changes in order to provide a more useful curriculum to its graduates. The results also indicate that employers are very much aware of what competencies should be possessed by their employees. It is recommended that other departments undertake such a study to ascertain the effectiveness of their current curriculum. A copy of the survey instrument used is available from the author upon request.

References

John E. Dunkenberger and Joseph J. Molnar. 1980. Agronomy Students at Southern Land Grant Institutions, **Journal of Agronomic Education,** 9:36-46.

George A. Ferguson. 1976. **Statistical Analysis in Psychology and Education.** McGraw Hill Book Company, New York.

Alvin Larke, Jr. 1982. "Assessment and Evaluation of the Curriculum and Other Academic Requirements of an Undergraduate Agronomy Program in a Major Land Grant University," Ph.D. Dissertation, University of Missouri-Columbia, Columbia, Missouri.

R.A. Likert. 1932, A Technique for the Measurement of Attitudes, **Archives of Psychology,** No. 140.

Daniel Tanner and L.H. Tanner. 1975. **Curriculum Development.** Macmillian Publishing Company, New York.

Bobai Yayock. 1981. "Crop Production Activities Performed by Young Farmers and Vocational Agricultural Instructors in Missouri," Ph.D. Dissertation, University of Missouri-Columbia, Missouri.

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Peer Response: An Effective Way to Incorporate Writing Into the Classroom

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Introduction

Writing is a skill that we begin learning at an early age. Students formally build upon their writing skills throughout their educational careers, but the completion of freshman English in college usually marks the end of writing training. Learning to communicate through writing, however, should not stop here. Writing is a skill that improves with practice, and we as teachers must seize opportunities to enable students to practice their writing.

When we as teachers write an article for a journal or popular magazine, rarely do we serve as the sole reviewer before sending it to an editor for publication. The article not only may undergo extensive revision by the author, but it is often critiqued by several colleagues before submission. In contrast, we often require students to write papers in our classes, but do little to foster the review process. Why not teach our students methods that have proved widely effective?

Peer response has long been used by professional writers, but only recently has the technique been systematically adapted to the classroom. Research on this technique and its use in education is fairly new (Klaus, 1975). Peer response capitalizes on the surprising ability of students to critique their peers' writing, and at the same time, allows students to learn more about their own writing and exposes them to a wide range of viewpoints. Not only can students learn to write better reports using the technique; they can also learn the subject matter more thoroughly. (Bruffee, 1978; Schiff, 1982; Sommers and McQuade, 1984).

This paper focuses on the peer response technique as a method to incorporate writing into the sciences, its benefits and shortcomings, a sample writing plan and resonse questions, and results of a survey conducted to evaluate the effectiveness of peer response in agronomy courses at Va Tech.

The Peer Response Technique

Peer response provides a structured mechanism for interchanging ideas and comments among students in a classroom setting. Students are informed of the peer response process and the procedures on the first day of class. Giving some brief explanations and assurances that their grades are not in danger, but will actually benefit, usually sets students at ease. Students are asked to select a topic for instructor review within the first two weeks of the term; most are able to select a

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topic at this point, especially when given a list of potential choices. Initial comments of "I don't know what to write about" change rapidly to specific questions and potential topics when students are shown a topic list that raises questions, stimulates thought, and arouses curiosity. For topics not on the list, only a few minutes are required to provide a brief comment on topics that are too broad or for which little information is available. Thus students begin work on the paper early in the quarter, and teacher feedback has already begun.

Once they have chosen the topic, they are instructed to perform some preliminary library research to develop a list of references which will serve as a major resource for the paper. Also at this time students prepare a writing plan--not a detailed outline, but a few words or sentences which define the purpose of the paper, specify an audience (if the instructor has not already defined the audience), and provide some logical organization to their thoughts and the ideas they collect from reference material. Adapted from those suggested by Judy and Judy (1981), the following questions help students decide what they will write and how they will write it.

Sample Questions for the Writing Plan

1. Who is the audience (if not assigned by the teacher)?
2. What is the purpose of the paper? To inform? To persuade? To motivate?
3. What is the single most important point that you want to get across to the reader?
4. What do you know about the subject, and what do you need to find out during your library research?
5. How will you introduce the topic and create reader interest?
6. What are the major points that you want to make and in what order will you make them? Why in that order?
7. In concluding your paper, what parting thoughts do you wish to leave the reader?

Two weeks later, students turn in a handwritten paper indicating the topic, a list of resource references, and the writing plan, all of which provide another opportunity for instructor feedback. During the seventh week, students turn in three copies of their handwritten drafts **to the instructor** to ensure that deadlines are met. Groups of four students are formed and copies of three different papers are handed to each student for peer response. In addition to random groupings, students may be grouped together who have written papers on related topics. Despite losing the opportunity to review a variety of topics, students usually show more interest and enthusiasm when they read topics similar to their own. Although many students say they enjoy reviewing a variety of topics, they also admit that it is difficult for them effectively to critique a subject they know little about. However, readers who do not know the subject matter are sometimes the best responders because they must rely solely on the written words; whereas knowledgeable experts may easily compensate for poor prose. Students' comments suggest that they learn more if they review papers on a range of subjects, but they become better reviewers if the papers are grouped according to topic. Having used both methods with success, I prefer the similar-topic method since it fosters an indepth focus on a single topic and sharpens diagnostic skills.

After they have received their papers for review, students are given one week to arrange a group meeting outside of class to discuss each other's paper. When adequate class time exists, one can set aside a lecture period for in-class peer response. Although the in-class method uses valuable lecture time, the complications of scheduling group meetings are eliminated; students are already convened, and the teacher is present to answer possible questions and facilitate the peer process. Despite the difficulty students have arranging group meetings outside of class, they generally have more time available to respond to other's papers than would normally be available in class.

At the same time that the papers are returned for peer response, I remind students of the value of writing and the purpose of the writing assignments used in the particular class that I am teaching. Students know the importance of writing--a survey (Appendix A) showed that 88 percent of the students thought that writing was important in their careers--but a realistic example drives the point home. In a meteorology class I teach, for example, they seem to take interest when I tell them that to become certified consultants they must demonstrate their writing ability by writing an essay.

It is crucial to the peer response process that students have some guidelines to follow when responding to others' drafts. The most important point is that peer response promotes collaborative learning that fosters helpful, honest, specific responses. Students also need to be shown what a useful response is. Contrasting a few examples of vague and useless comments such as "unclear paragraph" or "lacks organization," with useful, specific comments such as, "You don't explain why acid rain is important" or "You mentioned this same point in paragraphs 2, 7, and 11" illustrates effective responses. Elbow (1973) provides excellent advice to both readers and writers on how group members can positively respond to one another's writing.

Another method to guide students through the response process is to develop guidelines containing specific questions that students answer as they review a peer's draft. In addition to outlining the procedures to be used in the response process, use of a response sheet ensures that students focus on aspects such as organization and clarity rather than grammar and spelling. Through the use of specific response guidelines, teachers can shape the peer response and foster a positive attitude within the groups. Sup-

plemented with verbal feedback, written answers to questions on the following response sheet provide writers with some concrete responses that can be used during the revision process.

A Sample Peer Response Sheet

Instructions: Prior to the group discussion, each member of the group should have a copy of the rough draft. Please read the draft twice, once to get an over view of the paper, and a second time to answer the questions below. During the group meeting, quickly review your comments to refresh your thoughts of the paper. Remembering that your goal is to improve each other's writing, you should discuss the strong and weak points of each other's work. Please give all response sheets to the person whose work you are responding to.

1. What seems to you the paper's major strength?
2. Is the thesis clearly state? (circle one) Yes No I cannot find the thesis. State in your own words what you think is the thesis.
3. Does the topic seem to you sufficiently narrow for a paper of this length? Yes No If no, please explain how the topic might be narrowed.
4. Are paragraphs effective and well supported with specifics? Yes No If no, please list the numbers of paragraphs that need more work.
5. Do you think that the composition is clearly organized, that it has firm direction? Yes No If no, please explain the problem.
6. Circle any of the following that need work: spelling, grammar, punctuation, clarity, literature citations. Make corrections directly on the draft.
7. This is by far the most imporatant question. If this were your paper, what would you do to raise the quality of the paper to the next higher grade? (For example, has relevant material been overlooked? To give the writing more realism, could the author use specific examples instead of generalities?) Give specific examples of whatever you suggest.

Once the drafts and peer response are complete, students have another week to complete the final draft. Instructed to use their peers' comments and criticisms during the revision process to improve the final draft, students are free to accept or reject their peers' suggestions. Most students, however, eagerly seek and use ideas that they think will correct weaknesses in their papers. After the final drafts are complete, students hand in all writing response sheets, writing plans, and the first draft to the teacher. Having students hand in the response sheets reaffirms their sense of value and provides added incentive to complete the peer process. Refusal to accept final drafts without peer response sheets may provide stronger motivation to complete the peer process. The teacher may then use all the material to determine the final grade. Although such a wealth of material may seem to be overwhelming to grade, in practice only the final draft is usually graded. In fact, the grading process is often easier than when no peer response is used because drafts have essentially been pre-graded by peers. I use the additional material to assign final grades should some questions arise while grading the final paper. I can review the response sheets to determine if problems appearing in the final draft were detected by peers during the response process, or if writers ignored useful comments provided. Seldom do I review peers' comments except to periodically check on the effectiveness of the peer process.

Evaluation of the Technique

The advantages of using the peer response technique fall into those that help the student and those that help the teacher. The prime benefit that students derive is feedback **during** the writing process, not after the final paper is complete. Composition research has shown that evaluation of the final product by the teacher is only minimally effective as a learning tool (Dudenhyer, 1976; Beach, 1979; Thompson, 1981). Little motivation for improving writing and learning exists after the final grades have been assigned. Without this motivation students may not even read the comments a teacher writes on a final paper at the end of a quarter or semester--comments are often forgotten quickly once they have justified the final grade.

Without the benefit of comments and constructive criticisms during the writing process, students falsely assume that their writing is satisfactory, only to learn otherwise when the final papers are graded. Early feedback afforded by the peer response technique results in better papers and more learning. The survey showed that 81 percent of the students felt that peer criticism helped them write better papers.

One surprise: compared to students in classes which did not require writing, 86 percent of the students thought that writing helped them learn about the course content whereas 70 percent felt that the writing assignments helped them write better. Writing enhances learning--a concept long suspected by many, but only recently documented (Emig, 1977).

Perhaps the most important benefit of the peer technique is the improved diagnostic abilities that develop from the group interactions. Despite the fact that 43 percent of the students had difficulty responding to and effectively criticizing others' writing, nearly 74 percent of our students felt that reviewing others' papers helped them improve their diagnostic judgements and see weaknesses in their own writing. Often initially feeling shy and incapable of providing more than a "I liked it" or "I disliked it" response, students quickly discover that they have valid, helpful comments to offer on subjects they thought they knew little about. With practice, students soon learn to identify issues, raise questions, and defend their ideas in ways

they had not thought possible. Additionally, higher test grades and better papers provide evidence that students learn and understand subject matter more readily as they apply their new-found abilities to course content.

Using the peer response technique also benefits the teacher. At first glance the technique appears to require more work. In addition to grading the final draft, teachers must comment on topic selection and writing plans, discuss how to respond to papers, and arrange peer groups. But one of the most notable benefits of the technique is less work in grading. No longer do teachers have to struggle with a plethora of poorly written papers. Having fewer confusing sentences, grammatical mistakes and distracting word choices, good papers are easier to read and grade. Student peers not only help to correct the mechanics of a paper such as spelling and grammar, but they help their classmates eliminate problems with organization and content. Over 80 percent of our students reported that useful peer responses were more substantial than spelling and grammar corrections. This ability of students to comment effectively on their peers' writing is a characteristic of good student writers and shows that students are capable of providing useful evaluations (Sommers and McQuade, 1984).

Another important benefit of the peer response technique is that it allows teachers to incorporate writing into a wide variety of courses with a minimum of added work. In my department the technique has been successfully used in four different courses--cropping systems, meteorology, agronomic research, and crop physiology--and is currently being tried in soil physics. Instead of spending the usual 30 to 40 minutes per paper to grade poor work, teachers using the peer response technique can cut grading time--in my case, by 50 percent. The time saved can be used to discuss the peer technique, review topics and review writing plans during the writing process so that little extra time is required to implement the peer technique. Students' comments, test grades, and good papers suggest that any time lost normally spent on course content is more than compensated by the increased learning associated with writing.

One of the most common problems is to assume that the students know what peer response is. I have learned the importance of providing good examples of effective peer responses, developing useful response sheets, and describing a typical peer session. If these topics are glossed over or omitted, few students will have but vague ideas of how to respond effectively to someone's paper, they will be reluctant to share their ideas and criticisms with their peers, and they will view the process as a waste of time. It is important for the teacher not only to discuss the procedures and deadlines, but to help students develop the proper attitude toward the method and give them the guidance and structure they need to operate successfully.

Additional problems may arise once the peer response groups begin. Without the use of detailed response sheets, students fail to realize that the group has a clear, attainable goal, and they may use the peer group as an unorganized bull session. Using a peer response sheet with detailed instructions and providing a model of a typical response session alleviate this problem, especially if students are given the responsibility to conduct effective group sessions on their own.

Moreover, students' lack of knowledge about the purpose of writing in a subject-area course may pose other potential problems. Students do not see writing as a mode of learning; they view the learning of content as the sole purpose of the class; they incorrectly assume that the place for writing is in an English class; and they view the peer response technique largely as additional work. In students' eyes, the extra work is significant, especially if they habitually write a single draft in one sitting shortly before it is due. Hence, only 50 percent of the students would like to use peer response for all their writing assignments.[1] Further complications may arise when low grades are given to students who indeed know the content, but fail to express their knowledge clearly in writing. Since they have met their perception of what the course goals should be, the low grade falls short of the "A" they expect. Knowing these potential problems is half the battle in achieving their solution. As I have found in my classes, teachers can discuss methods, purposes, and values at the onset and thus avoid subsequent problems. Most important, as Healy (1982) has found, a sense of value of the peer response process must be instilled in the students for the technique to be effective. Emphasizing commitment to the writing and peer process can reverse the tendency of students to resent writing, and can foster positive views. Despite a rather unimpressive response to use the peer method again, the survey showed that students felt that the peer response process helped them see weaknesses in their own writing (74 percent) and helped them write better (81 percent). They also responded that not only did writing help them write better (70 percent), more importantly, it helped them learn the course content--their preconceived class goal.

Summary

The peer response technique can be incorporated into a wide variety of content-based courses in agriculture. If carefully designed and properly implemented, the method helps students improve their writing, diagnostic and cognitive skills, fosters positive attitudes toward writing, and increases students' understanding of course content. The method encourages the use of multiple drafts to simulate real-world

[1] I have subsequently learned from students' comments that they interpreted question 10 of the survey to mean increasing the amount of writing they do in all their classes. They like the peer response process, but given a choice, they would prefer little or no writing.

processes which teachers and professional writers use to create journal articles and other prose. In addition, these benefits can be attained with little added work for the teacher.

Literature Cited

Beach. 1979. The effects of Between-Draft Teacher Evaluation Versus Student Self-Evaluation on High School Students' Revising Rough Drafts. **Research in the Teaching of English** 13(2):111-119.

K. A. Bruffee. 1978. The Brooklyn Plan: Attaining Intellectual Growth through Peer-Group Tutoring. **Liberal Education** 64:447-469.

J. P. Dudenhyer. 1976. An Experiment in Grading Papers. **College Composition and Communication.** 27(4):406-407.

P. Elbow. 1973. **Writing Without Teachers.** Oxford Univ. Press, New York, 196 pp.

J. Emig. 1977. Writing as a Mode of Learning. **College Composition and Communication.** 28:122-128.

M. K. Healy. 1982. Using Student Response Groups in the Classroom. **In** G. Camp (ed.) **Teaching Writing: Essays from the Bay Area Writing Project.** Boynton/Cook Pub., Inc.

S. N. Judy and S. J. Judy. 1981. **An Introduction to the Teaching of Writing.** John Wiley. 193 pp.

D. J. Klaus. 1975. Patterns of Peer Tutoring. Paper presented at the 1975 Annual Meeting of the American Educational Research Association as part of a symposium on Cross-Age and Peer Tutoring: Current Practice and Research. ERIC #ED103-356.

D.M. Murry. 1968. **A Writer Teaches Writing.** Houghton-Mifflin, Boston. 256 pp.

Peter Schiff. 1982. Responding to Writing: Peer Critiques, Teacher-Student Conferences, and Essay Evaluation. pp. 153-165. **In** T. Fulwiler and A. Young (Eds.) **Language Connections: Writing and Reading Across the Curriculum.** Natl. Coun. Teachers English, Urbana, Ill.

Nancy Sommers. 1982. Responding to Student Writing. **College Composition and Communication.** 33(2):148-156.

N. Sommers and D. McQuade. (Eds.). 1984. **Student Writers at Work: The Bedford Prizes.** (Part IV). Bedford Books, St. Martin's Press. 256 pp.

R. F. Thompson. 1981. Peer Grading: Some Promising Advantages for Composition Research and the Classroom. **Research in the Teaching of English.** 15(2):172-174.

Appendix A

A Survey of Agronomy Students' Attitudes Toward Writing

A questionnaire on writing and the peer response process was given to students in four different agronomy classes as part of the formal course evaluation performed by students at the end of each quarter. The results are based on a sample size of 92 students in the following junior and senior level courses: cropping systems, agricultural climatology, agronomic research, and crop physiology. Agronomy majors comprised 82 percent of the sample. The respondents consisted of 11 percent sophomores, 33 percent juniors, 41 percent seniors, and 15 percent graduate students. The numbers listed beneath each question correspond to the percentage of responses in the categories listed below.

	Agree	Tend to agree	Tend to disagree	Disagree
1. The writing assignments in this course helped me learn more about the course material.	47	39	10	4
2. The writing assignments in this course helped me to write better.	23	47	24	6
3. I do not think writing skills will be particularly valuable in my chosen career.	5	7	18	70
4. Short writing assignments on specific topics help me learn more than writing a long term paper.	29	44	20	7
5. The benefits I gained from the incorporation of writing into this course were not worth the time and effort involved.	7	14	43	36
6. Reviewing someone else's paper (peer response) helped me to see weaknesses in my own writing.	30	44	24	2
7. Constructive criticisms received from others during the peer response helped me to write better papers.	44	37	16	3
8. It was difficult for me to openly criticize other students' papers.	20	23	25	32
9. The valuable criticisms I received from peer response mainly concerned spelling and grammar.	8	11	35	46
10. Given a choice, I would like to use peer response for all my writing assignments.	18	32	32	18